EXERGY PLANNING FOR CAMPUS HEERLEN (NL)

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What?
The development of an optimal energy system for the Heerlen campus, based on the principles of exergy planning. Exergy-planning is the realisation of spatial conditions for improved use of unused (residual) energy flows. This means:
• Improved use of the quality of energy
• Realisation of spatial energy cascades
• Use of residual energy flows (waste = food)
• Realisation of low-exergy energy demand (LowEx)
• Better use of high-exergy residual energy supply

Why?
• 30-40% of the energy demand comes from the built environment.
• Energy saving efforts are mostly done on the scale of the building
• Potentials of the regional scale have been undervalued till now
• Principles of exergy are not often used to reduce energy demand

Method
• Inventory of local present (residual) energy sources
• Inventory of sinks (demand for heat, cold, electricity and fuel)
• Apply techniques for conversion, transport and storage of energy
• Develop a plan based on up- and downcycling (cascade) of energy

Results
The result will be a plan for the campus in east Heerlen, making use of the local potentials and the principles for up- and downcycling energy:
• Use roof area for solar gain (electricity and heat).
• Windturbines along road for electricity production.
• Use waste biomass from agriculture, maintenance of nature and residential garbage for producing biogas.
• Transport biogas in pipelines to urban areas to CHP.
• Convert biogas in CHP to electricity and heat for grid.
• Cascade heat demand for different temperatures.
• Create a LowExergy energy demand for the buildings.
• Create LowExergy thermal grids for new districts
• Use existing heat grids in heat cascades
• Use local former cole mines for heat and cold storage.
• Connect heat and cold grid to regional thermal network
• Regional (Parkstad Limburg) thermal network is connected to industrial areas for residual heat, sand quarry lakes for cold, and Colemines for large scale storage.
• Clean residual from biogas production returns as fertilizer to the agricultural area around Heerlen.

References and acknowledgments
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